

Chapter 2

How Students Learn Analysis And Communication: Three Designs For Learning

How do college students learn abilities? Asking this question made it clear to us that we had to take into account more than our own assumptions and convictions. We had to create a learning environment that would enable the *student* to see these abilities at least as clearly as we thought we did, and would enable her to develop them effectively.

Each of us worked individually and in team and department work sessions to identify *analysis* and *communication* as they naturally occur in our disciplines in general, and in the particular courses we were offering. In this manner, we were able fairly rapidly to sketch out a common approach, while using our actual teaching as an ongoing "field test" of that approach, constantly refining and redesigning it. Repeating this semesterly cycle of theorizing and practice over several years now, we have found three key elements which contribute so powerfully to the student's learning that we regard them as indispensable to the learning structures we design. They are *explicitness*, *multiplicity*, and *individualization*.

I: THE DIALOG OF EXPLICITNESS

In order for our students to be able to deal with analysis and communication, our first task was to make clear how these related to the specific topics or tasks students work with in our courses. That meant we first had to work our own way deductively from the realm of the generalized abilities to the realm of classroom activity.

We began by breaking each ability into a sequence of levels, ranging from what we thought the student would most likely be able to handle when beginning college to what we wanted her to be doing by graduation. These gave us a way to make our expectations of student performance more *explicit*, and to pace and focus the learning process.

We broke analysis and communication into six levels, the first four being "general" levels required of every student and the last two being "specialized" levels appropriate to her major. The six levels we have identified for each ability are:

ANALYSIS	COMMUNICATION
1 Observes accurately	1 Assesses own communicating
2 Makes justifiable inferences	2 Communicates with analytic consciousness of the process
3 Relates parts or elements in patterns	3 Communicates with effective control of the process
4 Integrates patterns into coherent systems	4 Integrates effective communication within the framework of academic disciplines
5 Compares and tests frameworks in her discipline(s)	5 Develops and applies theoretical perspectives
6 Integrates frameworks into a professional synthesis	6 Integrates communication modes effectively in professional contexts

These levels of analysis and communication provide milestones or standards by which we can assess performance, as well as point a direction for development. In a system where no grades are given, they also serve as a means for charting each student's progress.

We should stress that the levels are not an invariable sequence that we have somehow discovered and through which all humans inevitably pass. They are a series of focuses we have chosen for the student's attention. In analysis, for example, it seems that one probably most often makes inferences by holding up what one has observed against relationships or patterns one *already* knows. We have chosen, for what we think are fairly obvious logical and pedagogical reasons, to move from (1) observation to (2) inference to (3) making relationships. We use the levels to focus the student's attention on one process at a time, to help her become thoroughly conscious of it, and to develop her confidence and versatility in using it.

Our next step was to break open each level into a set of more specific criteria. What are the hallmarks, we asked ourselves, of an activity like "observing accurately" or "communicating with effective control of the process"? Which particular elements can we and the student look to?

In dealing with communication, we identified certain general concerns. These include awareness of thought structure and ability to use it, a consistent attention to the other persons in the relationship, and a sure awareness of conventions appropriate to the particular mode and form of communication. But in order to be explicit enough about these concerns to make them useful to the student, we further identify criteria in terms of a particular mode. So we use a number of related but quite different-looking sets of college-wide criteria for each level of communication. For example, at Level 3:

WRITING	READING
1. Establishes context by clarifying limits of situation, and by making explicit relationships between various sources of ideas (own experience, instructors, research, general knowledge, specific authors)	1. Identifies writer's context and/or organizing framework including essential assumptions
2. Consistently uses words or expressions that show awareness of the audience's degree of knowledge, values, need for clarity, right to an opinion, and expectation of interest	2. Shows understanding of necessary vocabulary words either by recognition or by context
3. Consistently follows appropriate conventions with understanding	3. Identifies explicit and implicit relationships of writer/ thought/reader/ (e.g. purpose, tone, stance, attitude)
4. Shows overall sense of structuring ideas for an audience	4. Identifies explicit and implicit thought relationships (e.g. example, definition, analogy, cause, effect, deduction induction, metaphor)
5. Uses adequate development for clarification of message—with examples and/or evidence	5. Shows awareness of own reading processes and/or strategies
6. Shows consistent sense of own composing process and strengths and weaknesses in own writing	6. Shows awareness of specific strengths and weaknesses in own reading performance
7. (Criteria for appropriate content to be specified by instructor in discipline)	

(There are comparable sets of criteria for Speaking and Listening as well as for Media, Quantitative, and Computer Literacy.)

In dealing with analysis, we agreed to have the faculty in each discipline specify criteria in their own language, in terms descriptive of the analytic processes students would actually use in that field. Then we synthesized generic criteria from their experiences, like the following criteria for analysis at Level 4:

1. *Out of an explicit framework, articulates and distinguishes between observations, inferences, and relationships in work under investigation*
2. *Shows awareness of assumptions, implications, and limitations of any framework used*
3. *Identifies principle(s) that organizes or accounts for ways that elements relate in the work*
4. *Articulates how above principle(s) provides meaning in the work under investigation*
5. *Shows awareness of how the affective and intuitive relate to the cognitive in her own analyzing process and abilities*

Finally, in each discipline and course, we have had to specify the performance we want the student to undertake. This is not unlike the problem of creating an assignment — but once we had worked our way from the general ability through the levels and criteria, we had a sharply new perspective on this familiar teaching task.

For one thing, our decision to become more explicit about our goals has sometimes brought about a change in the substance of assignments. In introductory science, our lab "experiments" had often been only demonstrations of theorems learned in the lecture. They had made the theory more real to the student, and had developed her ability to follow directions and manipulate lab equipment. But in order to develop her ability to observe, we have had to hold off on the theorems, and create more open-ended labs. We now present the student with an event and challenge her to describe it, to find ways to quantify her description and make it repeatable. In a poetry class when focusing on analysis, we might put off discussions of the author's intent or the poem's meaning and first ask the student to observe carefully what has actually been stated, what may have been implied, and then what in each reader's experience may cause her to make inferences slightly different from someone else's.

The way in which we present assignments has also changed. We are careful to include (or ask the student to select and specify) an audience, purpose, and whatever other circumstances might best

assist the student to provide meaning in a given situation. The writing assignment, for instance, is one we have used in a second year psychology course:

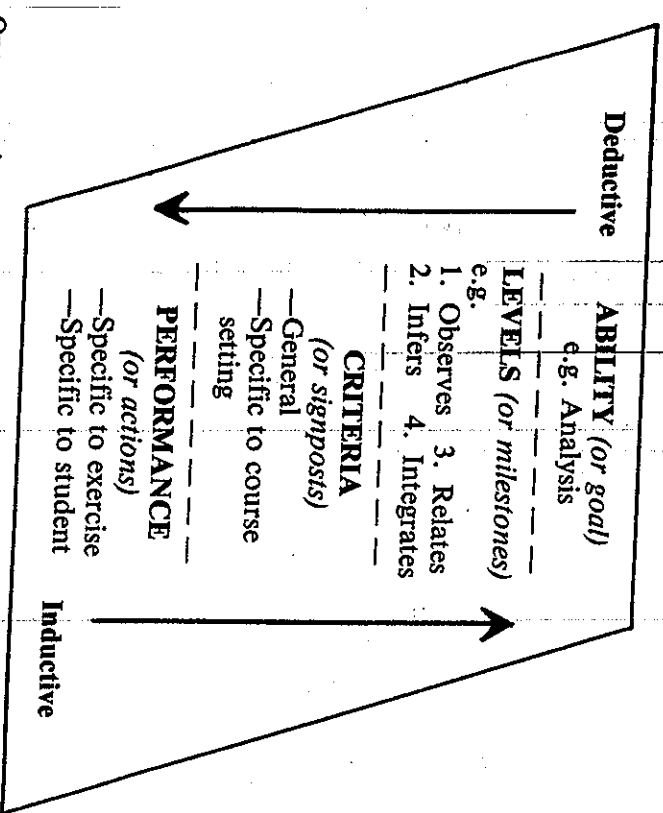
(Focus: To demonstrate understanding of basic concepts of behavior disorders, personality theory, and treatment, and to communicate that understanding orally.)

You are invited to write a 5-7 page paper to be used as reading material in the inservice training of RNs who are preparing to do volunteer clinical work. Your task is to review a problem area from the psychosomatic perspective called "disregulation." The hospital training director chose you to write this review because you are an honor student in a personality and psychopathology course. Therefore that director expects you to exhibit your mastery of the three major areas of the course: personality theory, behavior disorder, and psychotherapeutic treatment. Your objective in the paper is to take a problem like anorexia nervosa and determine whether or not it would qualify as a psychosomatic disorder. Whatever your conclusions, you should describe the best hope for a "cure" for your problem area. You will need to provide a description of the "disease" as well as review the treatment approaches currently in use.

The reminders about audience and purpose, simple though they might seem, represent a profound change for both teacher and student. For us, they represent the admission that we had frequently left audience and purpose vague, with the result that most of our students' papers were written to the teacher by default or to no audience at all. For our students, specifying a fairly realistic audience and purpose has meant a dramatic increase in their sense of the assignment's value and in their ability to undertake it effectively, which has in turn enabled them to gain new confidence in their own writing.

As professional educators we had, of course, always acknowledged the importance of being explicit. We had always striven to make our subjects and assignments clear, to explain them in terms of our intentions and goals — in hopes that the student might understand what we expect and why, and find her own motivation and direction through the learning experience. What we are now doing by starting with the abilities of analysis and communication, and working our way deductively to the level of the assignment, simply gives each of us a clearer and more detailed picture of the larger contexts. It also enables us to present our students for the first time with a set of explicit expectations and criteria shared by the whole faculty across all our disciplines.

The student, too, has a renewed responsibility to be explicit. While the instructor's efforts are to be explicit create the *framework* within which teaching and learning occur, the student's efforts produce the *activities* from which her learning can be inferred, evaluated, and directed. The interaction between these two can be represented graphically:



Once we as instructors have rendered our thoughts and intentions as visible as might be helpful, the student must then do likewise. First of all, she has to generate something — a speech, a set of notes, an action, a diagram, an essay, a drawing, her participation in a panel — translating her thought into perceivable action. Frequently, she will use the criteria in order to guide and revise her performance while it is in process.

Then we and the student together work inductively from the data of her performance, making inferences about her learning. Together we unfold her assumptions, her prior learning, her distinctive patterns of thinking and acting. Applying the criteria, we confirm the degree of her developing ability in this particular performance.

As she accumulates performances over time, further refining the ability, the student also internalizes the criteria and thus can infer effective performance herself. Eventually, after repeated performances in several settings, we infer that the student has demonstrated the ability.

The primary means for doing this inductive work of explicitness is what we call *feedback*. A student typically encounters feedback in two forms. She may first be given a list of the relevant criteria with those she met indicated in some way. But she also receives individual written and/or oral explanations of how well she did on the assignment. These comments do more than simply state again whether she met or did not meet a criterion. In them, each assessor — whether it is her instructor, a community professional in her field, or a classmate — tells the student to what extent she succeeded or did not succeed, and points out to her exactly where or why.

We consciously take advantage of this opportunity to make our thinking explicit for the student, to lay out the reasoning that led us to the conclusions marked on the criteria sheet. The student is thus able to *observe* another's analysis and also to challenge an assessor's judgments if the reasoning seems unclear or based on inaccurate assumptions.

Feedback also gives meaning to the criteria. For example, a beginning student will often have difficulty saying how well she structured her speech or paper. But as she receives consistent feedback from different assessors on the structure of her speeches and papers, she becomes able to see for herself how well she is performing. Having seen the criteria applied to several performances, she can better understand their meaning and the expectations they represent.

This rather fluid process, giving meaning to a set of criteria through feedback in several different settings, also assists the student to move away from absolutist thinking. She begins to understand writing, for example, as more than the rules and rubrics of grammar. She sees it as an ever-changing forum for her thought. She experiences the "rules" as dynamic, arbitrary at times, and always situation-specific. At the same time, however, the framework of levels and criteria ensures that she is assessed continually on consistent standards in all disciplines, from course to course. This not only makes for continuity but also gives the student a sense of stability and integrity as she develops her abilities to analyze and communicate.

The ongoing "dialog of explicitness," we have found, really works as something of a cycle with both partners participating on both sides. Once we have worked our way through the process deductively as curriculum designers, we move to the inductive side to work with the student inferring upward from her specific performances to the general ability. As she advances and gains confidence, the student begins to take some of the deductive role of the faculty, selecting her learning experiences (from course projects to independent studies and off-campus internships) and helping to define which abilities will be involved and how her development of them will be measured. In

addition of course, what we learn inductively from our students' actual experiences provides the primary force and guidance for reshaping the curriculum and our teaching.

The importance of explicitness finally rests in the central role of consciousness in learning. Basically, we ask ourselves and our students to be explicit in order to raise our thinking and our communicating to a more conscious level. Why? Making our processes conscious makes them *accessible* to ourselves and others, and renders our thinking and communicating patterns *modifiable* by bringing both content and process out into the light. It also helps to make the abilities *reproducible*, enabling the student to build habitual patterns through observation, reflection, and repeated action.

Explicitness works as the catalyst for consciousness; consciousness as the catalyst for understanding. As the student's thought processes are increasingly made accessible to herself and to others, and as she is consciously able to modify her thinking and communicating through negotiated understanding, she forms her own habitual patterns of analytic thought and effective communication. Her need for development, as she learns to interpret the implicit more surely in her analyzing and to embed it more gracefully in her communicating.

EMPHASIZING CONTEXTS

Being explicit is for us mostly a matter of making clear the relationships between an event or task or idea and its contexts. We use the word "context" here in its broadest popular sense of "surrounding circumstances." How inclusive do we make the realm of those circumstances? A deceptively simple answer would be that it includes whatever gives to the event or idea meaning that needs to be understood by someone — either communicator or responder. Actually we are attempting to get at some of the aspects of context that many contemporary theorists are probing.*

In a provocative synthesizing article, for example, Anthony Petrosky** argues that one's comprehension/composition arises from three factors — "the text, our affective and cognitive frameworks

*See, for example, Elliot G. Mishler, "Meaning in Context: Is There Any Other Kind?" *Harvard Educational Review*, 49 (February, 1979), 1-19; David Bartholomae, "Teaching Basic Writing: An Alternative to Basic Skills," *Journal of Basic Writing*, 2 (Spring/Summer, 1979), 85-100; F. C. Bartlett, *Remembering* (Cambridge: Cambridge University Press, 1932); Robert Anderson, "The Notion of Schemata and the Educational Enterprise" in R. Anderson, R. Spiro, and W. Montague, eds., *Schooling and the Acquisition of Knowledge* (Hillsdale, New Jersey: Erlbaum, 1977).

**From Story to Essay: Reading and Writing," "College Composition and Communication, 33 (February, 1982) 21, 22.

(or prior knowledge), and the context for reading." Thus, he proposes, "readers have to explain why they see what they do by explicating the forces that drive their discussion." Although at this point Petrosky separates context from the reader's knowledge and feelings, he is dealing with the explicitness of context that we consider significant enough to make an object of learning.

Further on in the article, Petrosky, in summarizing David Bartholomae's work toward a pedagogy for basic writers, asserts that "one of the important distinctions between good and bad public academic discourse is, then, that good public discourse articulates this prior knowledge or individual point of view so that it is accessible to others who need the information in order to understand the writer and his or her contexts." Here Petrosky seems to be extending the ordinary external aspects of context. He includes, as we would, whatever is internal to the communicator that can be identified as surrounding circumstances because they affect the meaning he/she makes — knowledges, beliefs, feelings, associations, assumptions.

Actually, most of our students have seldom considered "context," or the importance of making contexts explicit. They may have learned that one can often infer the meaning of a word in a text by considering the surrounding words and sentences, but they do not often see that any event must be looked at in context in order to be fully understood. At first, having to look at the situation that surrounds an event (even the event of her own writing or speaking) strikes the beginning student as a peculiar intrusion. Eventually, however, the habit of looking for context frees her analysis from the prison of assumed certainty, and frees her communication from the aimless writing and speaking often characteristic of beginning efforts.

We therefore make quite a point of bringing "context" into the open. This critically important habit of mind for both analysis and communication does not arise full-blown in response to our first explicit assignment. The student develops her sensitivity to context gradually, we have found, as she moves from being able (with guidance) to see a simple immediate context toward being able independently to perceive and consider several larger contexts simultaneously. For example, the specified writing criteria for establishing context, or clarifying limits of situation and sources of thinking, are:

- Level 1 Clarifies for reader at the start the basic elements of framework and purpose (*What* am I telling *whom* under *what conditions* and *why*?)
- 2 Continues to clarify context of thought out of that framework, distinguishing own observations

- 3 Makes explicit relationships between various sources of ideas (own experience, instructors, research, general knowledge, specific authors)
- 4 Clarifies the preceding in relation to framework(s) from academic disciplines

Preparing a beginning student to analyze an article as an active reader, we point out that, like words in a sentence, academic articles do not exist without context. They appear within journals or books; they are dated; they come out of particular academic disciplines; they are written by people with particular credentials. Beyond that, their writers shape their meaning out of particular perspectives — sometimes selected for a given purpose, sometimes assumed as an unstated bias.

We also discuss with our students that their own writing and speaking do not occur in a vacuum. We stress making context clear so that their message can be understood. We insist that they make explicit for themselves aspects like the audience, the purpose of the communication, their personal goals, their role and stance in relation to the audience and the topic, and their organizing framework. We state, in their papers and speeches, whichever of these elements of context would clarify their message. By this practice, students not only remind themselves of the context, but they let the audience in on their perspective.

The beginning student often uses a simple formula approach, listing the “who, what, why, and to whom” in her opening. This approach, although not a sophisticated one, helps her become habitually aware of setting context. After a while, however, she may tire of this repetitive formula and begin to experiment with more interesting and imaginative ways to establish context. She may try to imitate the “context-setting devices” she has learned to identify as a critical reader (a process we encourage). As she does so, she moves her own context-setting further into the fabric of her text or speech. Eventually, it becomes an informing awareness that sustains her entire communication.

In like manner, we work to develop her sensitivity to context as an important tool for handling data critically, for assessing arguments and theories, and for conducting her own inquiries. From the beginning, we ask the student to clarify which information in a paper or speech is her own opinion, which the instructor’s opinion, which the exbook author’s, and so on. Later, we extend this to distinguishing inference from observation, evidence from conclusion, individualized

- f synthesized experience. She does this with her own communicating and also with the texts and articles, videotapes and art works she is studying in her various courses.

The student discovers how context shapes intellectual or practical inquiry as surely as it shapes communication, as she applies the approaches of different disciplines (or of different schools within a single discipline) to a common problem. She learns to trace the influence of such broad contexts as social and cultural settings — whether she is examining the meanings evoked by a piece of 12th century Buddhist sculpture, looking at the impact of social and political forces on a scientific investigation like atomic fission or genetic engineering, or tracing attitudes toward a public child care proposal among the citizens of a multi-ethnic metropolis.

Eventually, we expect the advanced student to be able to perceive and make explicit a whole array of contexts, both in her analyzing and in her communicating. These expectations converge when, as a beginning professional, she sets forth her own “credo.” In this she outlines the framework of assumptions and values which guide her thinking and practice, and relates them to her field, her community and culture, and her world. Beyond formulating this statement, the student must communicate it — as applied to a major professional issue — before an audience of peers. She also applies it in extended field experiences where she analyzes her involvement exhaustively to derive her “theory in use” and compare it, with the assistance of a mentor, to her “espoused theory.”*

The beginning student tends to see all this emphasis on context as simply a set of requirements. While she usually zeroes in soon on audience and purpose as visibly relevant, she may still accept the other kinds of context as something she must cope with at our insistence. Gradually, however, she grows beyond this “checklist” mentality as she comes to realize how context actually does create meaning, and how multiple contexts inevitably converge about an event or symbol.

Finally, the advanced student actively seeks to develop the habit of looking at and being explicit about contexts — as many contexts as possible — as the distinguishing quality of genuinely effective analysis and communication. For our most successful students, the contextual habit has become so ingrained even during college that they tend to become unaware that they are doing it. The heightened self-consciousness we have created, by means of focused self

* These terms were used by Chris Argyris and Donald Schon in describing a similar process they have developed for training graduate interns. *Theory in Practice: Increasing Professional Effectiveness*. San Francisco: Jossey-Bass, 1974.

assessment, diminishes again (though it remains ready for retrieval in periods of reflection) as the student internalizes the need for clarifying context and focuses most of her attention outward on what the situation requires.

II: EXPLORING MULTIPLICITY

By the time we had made communication and analysis explicit, we were already creating *multiplicity*. In analysis we had to deal with the varied analytic frameworks of our different disciplines. In communication we had multiple modes to deal with as well: reading, writing, speaking, listening, quantitative literacy, visual literacy, technological literacy.

In part, this was something we had inherited in the very structure of academe, and in traditional assumptions about the nature of liberal education. We had taken for granted, at some level, that experiencing multiplicity of disciplines was an important part of becoming educated. In similar fashion, we had consistently respected diversity of approach and uniqueness of style among our faculty colleagues. In fact we had encouraged students to experience learning with many different instructors.

Beyond this heritage of multiplicity, many of us had recognized varied learning styles in our students. We had also been exploring the variety of developmental stages and life contexts that students bring to learning, especially as our student population diversified year after year.

But we had orchestrated all these assumptions loosely, if at all. Now we were taking on the responsibility for attempting to find how these varied experiences of multiplicity contribute to our students' learning. We were going to have to choose which experiences best contribute to a student's ability to think analytically and to communicate effectively.

As we have worked with our students, we have found that multiplicity does indeed contribute powerfully to learning. The versatile communicator is the one who has mastered multiple modes and styles of communicating, just as the thorough and creative thinker has appropriated a wide range of analytic frameworks and approaches. At a deeper level, as the very terms "to master" and "to appropriate" imply, multiplicity contributes best to learning in tandem with its opposite — the unifying and directing that alone can orchestrate diverse means into a consistent effort.

In practical terms, we as educators have found multiplicity to be most important and productive in four contexts. First, there are the *disciplines* themselves. Then there are what in communication we

have called "*modes*" and in analysis "*frameworks*" — the variety of systematically consistent approaches by which one can analyze or communicate even within a given discipline. Third, we have learned to take the diversity of individual *approaches* to teaching and learning very seriously, and to design our teaching/learning experiences accordingly. And finally, we have been repeatedly impressed with the crucial importance of learning to see and think and communicate from a variety of *perspectives*.

MULTIPLE DISCIPLINES

The multiplicity of disciplines inherent in our academic heritage represents an invaluable deposit of wisdom about how humans best learn. One of the first things we found ourselves having to do, however, was to introduce some integrating influences, but still preserve structural diversity. Our very identification of analysis and communication as college-wide goals has served this function. So has our creation of interdisciplinary "integrating" courses and learning experiences at several points along the curriculum, which focus the student's energies on the task of pulling together common threads from her diverse experiences.

The familiar "specialization vs. distribution" antithesis actually points to a necessary dialectic in the student's learning. Our varied disciplinary settings provide her with the opportunity — and the obligation — to find concrete meanings for the generic notion of "analysis" as she learns to observe scientifically, to make inferences according to the canons of historical study and to draw relationships and patterns in formulating a nursing diagnosis or a market projection. We also provide her with opportunities to return periodically to ask such integrating questions as "How is my ability to analyze developing?" or, at a later stage, "Which approach to analysis is the most congenial to my own thought?" or "Which analytical frameworks will I use as a professional in such a situation?"

MULTIPLE MODES

The same dialectic between exploring multiplicities and reflecting on unities operates as the student develops the modes of communication. Not only is her writing a way of learning, but so are systematically active reading, speaking, film-making, interpreting graphs, and so on. Each of these provides her with a slightly different experience of how she thinks and communicates, as well as a different angle of insight into the subject and different principles for organizing it. Within each mode, she begins to develop a sense of

her own style — her versatility increases. And among modes, she similarly gain sense of which media she prefers under which circumstances.

The dialectic operates in almost identical fashion as the student learns to apply the varied analytic frameworks within a given discipline. Beyond simply learning about the "schools" of psychology, for example, she experiences how asking questions from a behavioral framework shapes what she looks at, what kinds of inferences she makes, and what relationships she draws. Asking questions from a Freudian framework about the same phenomena, she discovers how her analytic processes have subtly shifted — and how, at the same time, they have remained consistent.

MULTIPLE TEACHING/LEARNING APPROACHES

Many of us, in working to teach more effectively, had become convinced that we need to make more diverse opportunities for learning available within each course. We had also found that few students are aware of their preferred or most effective learning modes or styles or methods. And even fewer are aware of *teaching* modes or only learning approach that might either facilitate or tend to confound the students might improve their learning power if they become aware of and can articulate the approach they tend to take when faced with an intellectual task. Do they, for example, act primarily as concrete or abstract thinkers, reflectors or experimenters, readers or listeners, speakers or writers, generalizers or specifiers?

Once the student begins to know some of her own approaches to figuring things out and expressing herself, she can trust her own experience enough to move beyond it. Trying multiple approaches then becomes a major means for her to develop her communicating and analyzing abilities.

Beginning students, we have found, look for an approach that will work for them. At the same time, however, they often believe there is one "right" approach that the teacher knows and that "the good students" gradually discover. We therefore have students articulate their own approaches so they can see that some of their peers use similar approaches, that others use very different ones, and that all can be "right."

In generating ideas for writing, for instance, one student might hesitantly admit that she keeps asking herself questions about her topic until she gets a starting idea. Another might describe how she keeps subdividing her topic until she has something to start with.

Another might say she tries both of these and if they don't work, she goes on to compare her topic to something unusual — "it is like peeling an onion . . . like wilderness camping . . . like suddenly becoming Adam or Eve."

Whether or not a student finds her own approaches working well, trying out others will increase her viable avenues of development. Trying out multiple ways of thinking and communicating enable her first to *find out what works best for her*. A student's discovery that "I can understand the textbook if the instructor explains it," for example, can be her first recognition that she processes information best when it is presented orally.

Trying out multiple ways of thinking and communicating also enables the student to *develop new strategies for the times when her best will not work*. The student who says, "I like to read, but the lecturer hasn't written a book," has clarified a problem in integrating teaching and learning styles. She has begun to work at solving that problem when she wonders whether she might not be better off if she could take in information orally as well as visually, perhaps using written notes as an interim aid to developing this new approach.

Finally, trying out multiple ways of thinking and communicating gives the student *new ways to see familiar things and to discover new ones*. We frequently hear first or second year students say something like, "I hated science. But once I forced myself to take a look through a microscope and figure out what was going on, I got some new things to think about. Science is still hard for me, but I like what it does for me." By challenging such a student to try new approaches we are assisting her, ultimately, to develop the openness and resourcefulness that will enable her to become a creative professional in her field.

First, however, each student needs frequent opportunity to look reflectively at herself and develop a sketch of her preferred *learning* styles. Then multiplicity of *teaching* styles among us as a faculty, and within each of our classrooms and labs, enables her to find and make strategic use of her preferences and strengths as a learner. At the same time, it enables us to insist that she also develop those styles and approaches she does not prefer. Multiplicity thus provides her with support for her learning styles as an individual, and challenges her to extend her limits and become as versatile as possible.

MULTIPLE PERSPECTIVES

Finally, we find that multiplicity serves the student's learning in the area of perspective-taking — which is not only a needed ability in analyzing and communicating, but also constitutes one of the most

cial achievements of the entire college experience. If our students are to graduate with the ability to look at things from several sides, to tolerate values from cultures other than their own, to understand someone else's point of view without necessarily adopting it — all of which are inherent in liberal education and essential to a free and just society — then they need extensive experience in trying out these abilities. And much of that experience comes in the process of developing their communication and analysis abilities.

We therefore continually provide experiences of varied perspectives for the student. In introductory writing courses, for example, we have the student consciously write from her own varied perspectives as student, daughter, citizen, and others she identifies — mother, part-time worker, or avid reader, for instance. Shifting perspective — so we have her write with other students as an audience, or her advisor, or readers of the local paper, or a high school class for whom she can serve as an authority. We have her write to recommend or clarify, or to propose an idea or action. Shifting perspectives thus enables the student to develop a conscious habit of analyzing her purpose, audience, and framework, and using that analysis to shape her communicating.

As the student becomes more advanced in her thinking and communicating, she becomes aware of the strengths and limitations of her own perspective. Gradually she learns to use the taking of another's perspective as a regular and valuable strategy for finding important aspects she is missing. In a week-long assessment, for instance, we might ask a nursing student to communicate — in effect, to think, make decisions, evaluate, and solve problems — in a hospital supervisor. Or a humanities major might spend a week as a staff member of a simulated cultural center, which publishes a literary magazine, provides educational opportunities for a specific neighborhood, and does research that fosters the development of new knowledge. Or a psychology major might act as consulting psychologist to a firm that needs careful data collecting, analysis of that data in relation to an environmental framework, and finally a credible diagnosis and prescription.

Another example of taking alternate perspectives on a more advanced level is an exercise faculty mentors use with advanced students engaged in off-campus learning experiences. To assist them in evaluating their performance — whether as assistant to the public relations director of a metropolitan performing arts center, or as a computer programmer for a manufacturing firm — we ask each student, "Describe your work from your on-site mentor's perspective. How might he or she perceive what you are achieving?" Simple though it sounds, this assignment has proven semester after semester

to be a milestone in the student's experience of her internship project, causing her to bring together her experience of both the academic and field perspectives of her discipline.

Multiplicity — of discipline settings, of modes and frameworks, of learning approaches, and of perspectives — has thus become for us a key to helping students learn to think and to communicate. Wherever we can, we encourage the dialectic between exploring multiplicity and reflecting on unities. In seeing how multiplicity contributes to our students' developing of analytic and communicative abilities, we have also gained a renewed appreciation of its contribution to liberal education in a pluralistic world.

III: INDIVIDUALIZING LEARNING

When we say we use "individualized learning" to help students develop their abilities as thinkers and communicators, we do not mean that term as it is most commonly understood. We do not mean that we spend most of our time working with a single student on a one-to-one basis while the rest study at their own pace on individually tailored assignments. Our students go to classes that involve group instruction and general goals defined for everyone in the course.

For us, "individualizing learning" means setting forth those goals explicitly, providing information and a multiplicity of opportunities so that each student can try to achieve the goals by various means, and stopping often to let her know specifically how well she is doing. It means enabling each student to find a way within a shared situation to develop her own learning process.

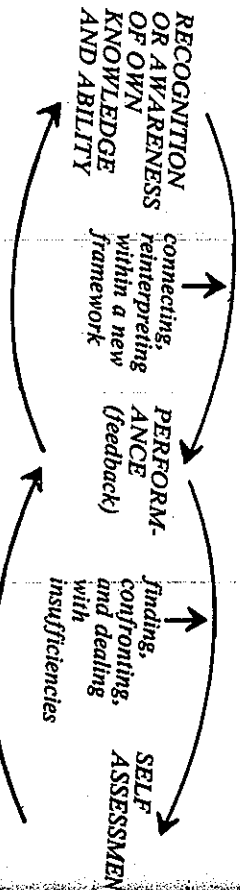
Each student is the major actor. We set the stage with common classes to attend, common subject matter and assignments, common abilities to develop and criteria to meet. The student participates in this common environment — yet at the same time she uses it as a framework for individual action. She approaches an introductory science lab or an advanced humanities seminar from her own background and experience, she connects with it by using particular learning strengths or preferred styles, and she generates her own unique performance.

What makes the student's experience so intensely individualized is her active participation in applying her abilities, her personal feedback from her assessors on her performance, and her work as a self-assessor evaluating her own performance. Her learning may begin in the common setting, but it soon arrives at the highly personalized

territory of analyzing her performance to determine her developing strengths and scribe her emerging style and to plan her further learning.

This, we find, is the real payoff of criterion-referenced learning — that for the student, the outcome of her efforts is not a cryptic reference to a mathematical ideal (e.g., 84%) or a group norm (as in placement on a curve or rank list), but a detailed point-by-point discussion of her own development in terms of defined abilities she is aiming toward. Her learning not only has a personalized focus and meant to enter into and gradually take over the process of defining, measuring, and guiding her own learning. We see this self direction as the ultimate individualization of learning.

Whether a student is analyzing poetry or ecological systems, writing a critique of economic policy or directing a series of videotapes, we have observed that her learning moves — often repeatedly — through a sequence or cycle which can be diagrammed as follows:



As she moves through this cycle, the student makes her learning her own. She begins by identifying something in herself, something she has done or experienced, and recognizing it when it is called by a new name. She then connects this new concept to the larger framework of which it is a part, often at the same time trying it out in different settings and situations and thus extending its meaning about herself — how she uses the concept or ability in those settings, and how she deepens and recreates meaning for herself by working through the interrelations and contradictions of an increasingly complex set of conceptual frameworks. This constitutes a new, more complex awareness which begins the cycle again at a more sophisticated level. * The student's growing ability to self assess

* This cycle continues beyond the student's formal education. In the diagram "feedback" is noted in parentheses because outside of the educational environment it may not necessarily accompany each performance. We use feedback to help the student internalize the habit of self assessment. But by the time she graduates, she is ready to continue benefiting from the feedback of others without being dependent on it.

lives not only self monitoring and evaluation; it is a synthesizing ability. If a student internalizes the ability to self assess and sufficiently refines it, she has a strong start in continuing her own education. For self assessment can provide her with the insight into her own development and the confidence it takes to confront formless, unorganized material and develop new abilities in dealing with it.

In developing analytic ability, the student may be observing human behavior in a psychology lab or the design of short stories in a humanities class. What she finds in her initial observations of people's actions and inferences about the effects of those actions enables her to identify the framework out of which she has habitually observed truthness to "her world." With such a start, we can also relate the student's observations to a new conceptual framework — formalism in literature, perhaps, or classical conditioning in psychology. Then the student tries out her awareness of the new framework in new situations. Eventually she begins to evaluate what she can now observe and what she next needs to learn, to develop her analytic ability further.

In communication, we likewise encourage the student to begin with the way she already approaches her ability. When the beginning student takes a close look at her own writing, or even at her own way of generating ideas, she can already make some observations out of her own experience. She may focus on only linguistic "offenses" she is aware she commits, thus revealing a punitive writing-as-following-rules conceptual framework. Or she may evaluate her writing from a very different perspective: "These are ideas that I really believe" or "feelings that I really have," revealing an egocentric or writer-based-prose* framework.

At this point we as instructors take an approach similar to the one we use to facilitate the development of analytic thinking. We identify and affirm existing frameworks. Then we assist the student to learn a new framework and apply new names to what she has found in her writing. As she learns to see rules within the framework of a living language, for example, an "offense" may become "a colloquialism — appropriate in some situations." As she learns to see writing as an interactive mode of communication, she can begin to apply a reader-based-prose* framework and recognize that, despite its

* Since Linda Flower and John R. Hayes first used these terms to categorize prose, they have been used frequently enough in theoretical works on writing to seem as if we have "always used them." They refer, respectively, to prose that borrows its structure from either the writer's own discovery process or from one inherent in the material examined by the writer (writer-based); or to prose that has a structure that meets the practical and cognitive needs of the reader (reader-based). See "Problem Solving Strategies and the Writing Process," *College English* 39 (December, 1977), 449-461.

expressive qualities, her paper also needs persuasive power if it is to be effective.

As the student advances, she begins the cycle over and over again, each time with more developed experience and awareness, each time building on what she can already do. Depending on how unfamiliar an area of knowledge is or how complex the new concepts or abilities are, she may sometimes feel as if she is starting all over. At other times she may have a sense of leaping to an advanced stage without being aware of precisely when and how it happened. Always, however, she is able to develop a cumulative awareness of her own growing abilities to think through and to communicate what she is learning. She also continually expands her awareness and mastery of varied strategies and resources she can use.

Each student's step-by-step (or leap-by-leap) progress manifests a unique pattern, rate, and quality — influenced, of course, by factors as varied as her preferred cognitive style or her sense of humor or her job security. She gains understanding and some control of her progress as she moves repeatedly through the cycle of self assessment. Her peers, in her frequent experiences of mutual peer assessment, help her to see the uniqueness of her own development alongside each of their individual constellations of strengths and weaknesses, approaches and styles. And we as instructors can make a considerable difference, we find, by creating a common environment distinguished by an unusually explicit consensus about the abilities we are aiming at, which leads the student quickly onto the individual ground of her own personal development. In such a learning environment, we and our students work together to enhance each student's unfolding expression and understanding of her own individuality.